

## REMARKS

Claims 1-13, 52-53 and 59 are pending.

Claims 1, 5, 7-8, and 12-13 are amended.

Applicants request reconsideration of claims 1-13, 52-53 and 59.

### I. Rejection of claims under 35 U.S.C. §102

Claims 1-4 and 8-13 are subject to at least one of three novelty rejections raised by the Examiner, citing Horiike (U.S. Pat. No. 5,290,609), Nishioka (U.S. Pat. No. 5,489,548), and Summerfelt (U.S. Pat. No. 6,362,068). Applicants have clarified the physical distinctions between the invention expressed in the claims and the art cited against them.

Claim 1, for example, has clarified the physical characteristic that at least two layers of a plurality of high-K dielectric layers exhibit different degrees of oxidation. Dependent claims 2-4 benefit accordingly. Claim 8 has been clarified to indicate that its second high-K dielectric has a lower oxygen density than the first high-K dielectric. Dependent claims 9-11 benefit accordingly. Formerly dependent claim 12 has always required that the second high-K capacitor dielectric, as originally presented in claim 8, contain an amount of oxygen different from the amount in the first high-K capacitor dielectric. Claim 12 has been clarified to indicate that the second high-K capacitor dielectric contains an amount of oxygen *per unit volume* different from the amount *per unit volume* in the first high-K capacitor dielectric. Claim 12 has also been amended to independent form by incorporating the limitations originally presented in claims 10 and 8. Claim 13 has been clarified to indicate that one of the sub-layers of the dielectric is more oxidized than another sub-layer of the dielectric. Applicants contend such clarifications overcome the novelty rejections of claims 1-2, 4, 8, 10, and 13 in light of Horiike or Nishioka as well as novelty rejection of claims 1-4 and 8-13 in light of Summerfelt.

### II. Rejection of claims under 35 U.S.C. §103

The Examiner articulated two bases for obviousness rejections; each basis is addressed separately below.

#### A. Rejection of claims in light of Horiike

The Examiner rejected claims 5-7 and 52-53 as being obvious, citing Horiike as the only reference. The Examiner further acknowledged that Horiike failed to disclose all of the limitations therein but argued a prima facie case for obviousness had been satisfied in light of MPEP standards or case precedent.

Concerning claims 5-7, they depend directly or indirectly on claim 1, which has been clarified to indicate that at least two layers of a plurality of high-K dielectric layers exhibit different degrees of oxidation. Applicants contend that Horiike fails to disclose such and the MPEP standard cited by the Examiner does not cure that failure.

Claim 52 concerns a capacitor dielectric comprising a plurality of layers defining a total thickness ranging from 50 to 70 angstroms, wherein each layer of that plurality is a high-K dielectric. The Examiner interpreted Horiike as failing to teach that thickness range but concluded the claimed range was an obvious design choice, citing case precedent. Applicants contend the Examiner has mischaracterized Horiike and that a careful reading of the reference demonstrates that it teaches away from the claim and the cited cases are not applicable.

The Examiner appears to suggest that Horiike merely passively fails to teach the claimed range of total thickness for the plurality of high-K dielectric layers. (Office Action dated 8/20/04 at p. 5.) However, a careful reading of Horiike, including excerpts cited by the Examiner, demonstrates that Horiike actively teaches away from such a limitation. Curiously, in attempting to reject this claim, the Examiner admitted that Horiike teaches providing high-K dielectric layers, wherein each layer is 40 angstroms thick. (Office Action dated 8/20/04 at p. 4 (citing Horiike at col. 7, ln. 35-36).) Applicants note that Horiike reiterates the 40 angstrom-thick individual high-K dielectric layer earlier – col. 6, ln. 35-36. Moreover, Horiike teaches providing multiple high-K dielectric layers. (*Id.* at col. 3, ln. 10-32; FIGS. 2&4.) Accordingly, Horiike teaches ordinary artisans a plurality of high-K dielectric layers defining a total thickness of at least 80 angstroms – which represents greater than 114% of claim 52's upper limit and 160% of claim 52's lower limit for thickness. This is in fact what Horiike illustrates in FIG. 2. Horiike's FIG. 4, also cited by the Examiner, teaches even further away from that claim limitation; FIG. 4's four high-K dielectric layers define a total thickness of 160 angstroms – which represents greater than 228% of claim 52's upper limit and 320% of claim 52's lower limit

for thickness. Applicants contend the Examiner's mischaracterization of Horiike alone demonstrates a failure to satisfy the burden for rejection. Applicants further submit that an accurate interpretation of Horiike indicates that the reference actively teaches away from the claim and therefore supports non-obviousness.

Moreover, Horiike's actively teaching away from the claim distinguishes the current facts from those cases cited by the Examiner. None of those cases appear to address a situation where the Court dealt with prior art references diametrically opposing the claimed invention. At best, the cases' prior art appeared to be silent concerning the relevant claim limits. In *Rose*, for example, the Court acknowledged that the prior art disclosed lumber packages that "can" be lifted by hand; but neither the Court nor the appellant indicated that such art teaches away from the relevant claim limitation of a lumber package sized to require lifting by truck. (*In re Rose*, 220 F.2d 459, 105 U.S.P.Q. 237, 240 (C.C.P.A. 1955).) In *Rinehart*, the Court expressed that there was nothing to indicate the prior art processes were ineffective on the commercial scale required by the claim at issue. (*In re Rinehart*, 531 F.2d 1048, 189 U.S.P.Q. 143, 148 (C.C.P.A. 1976).) In *Gardner*, the patentee attempted to distinguish from the prior art by arguing that such art "does not specify" the claimed dimension. (*Gardner v. TEC Sys.*, 725 F.2d 1338, 220 U.S.P.Q. 777, 785 (C.A.F.C. 1984).) In *Dailey*, the applicant attempted to address the prior art by arguing such art was "devoid of any suggestion" concerning the claimed dimension. (*In re Dailey*, 357 F.2d 669, 149 U.S.P.Q. 47, 49 (C.C.P.A. 1966).) Thus, assuming *arguendo* that the case precedent supports the Examiner's statement of the law, those cases are distinguished from the current facts, and the Examiner's proposition is therefore inapplicable.

Dependent claim 53 incorporates the limitation discussed above and benefits accordingly from that limitation as well as the preceding arguments. Moreover, claim 53 expressly adds the requirement that the lowest of claim 52's plurality of high-K dielectric layers define an individual thickness of about 20 angstroms. Arguments similar to those supporting claim 52 apply here as well. Specifically, the Examiner has once again mischaracterized Horiike by indicating that reference merely fails to teach that limitation (Office Action dated 8/20/04 at p. 5.) In fact, Horiike expressly teaches away from that limitation more than once; teaching ordinary artisans to provide a high-K dielectric that is 40 angstroms thick – about 200% of claim 53's thickness limitation. (Horiike at col. 6, ln. 35-36; col. 7, ln. 35-36.) The Examiner even cited Horiike's contrary teaching in attempting to support the obviousness rejections. (Office

Action dated 8/20/04 at p. 4.) Moreover, Horiike's contrary teachings provide a distinction from the facts in the cases cited by the Examiner, wherein the prior art in those cases does not appear to have directly contradicted the claims. (See *Rose*, 105 U.S.P.Q. at 240; *Rinehart*, 189 U.S.P.Q. at 148; *Gardner*, 220 U.S.P.Q. at 785; and *Dailey*, 149 U.S.P.Q. at 49.) Hence, once again assuming *arguendo* that the case precedent supports the Examiner's statement of the law, those cases are distinguished from the current facts, and the Examiner's proposition is therefore inapplicable.

Therefore, a careful reading of Horiike demonstrates (1) the Examiner's mischaracterization of Horiike; (2) Horiike's teaching away from claims 52-53; (3) the distinction of the cited cases; and (4) the inapplicability of the Examiner's legal proposition. Applicants contend that any one or combination of these factors demonstrate that the burden for rejecting claims 52-53 has not been met.

#### B. Rejection of claim in light of Horiike and Imai

The Examiner rejected claim 59 as being obvious in light of Horiike in combination with Imai (U.S. Pat. No. 5,440,157). However, an obviousness rejection requires that the multiple prior art references suggest to one of ordinary skill in the art to combine the references. (See *United States Surgical Corp. v. Ethicon Inc.*, 103 F.3d 1554, 1564, 41 U.S.P.Q.2d 1225, 1233 (Fed. Cir. 1997).) Moreover, when the prior art contains conflicting references, the inability of each reference to suggest solutions to one of ordinary skill in the art must be considered. (See *In re Young*, 927 F.2d 588, 18 U.S.P.Q.2d 1089, 1091 (Fed. Cir. 1991).) Specifically, the Examiner must consider whether one reference discredits another. (*Id.* Copies of these cases are included in an appendices to this Response.) Applicants contend that Horiike and Imai conflict to such a degree that one of ordinary skill in the art would be discouraged from attempting to combine their references.

For instance, Horiike touts high-K dielectric layers (Horiike at col. 2, ln. 15-16) but warns against retaining carbon near dielectric (*id.* at ln. 43). Horiike characterizes carbon as a contaminant, specifying that carbon causes leakage current and lowers the "withstand voltage." (*Id.* at ln. 39-45.) Accordingly, Horiike teaches removing the carbon. (*Id.* at col. 3, ln. 15-32.) Imai also favors the use of a high-K dielectric (Imai at col. 1, ln. 53-57) but warns of the

problems that may be suffered. (*Id.* at ln. 41-50.) Specifically, while high-K dielectrics have a desirably high permittivity, they also have a small “forbidden band width (band gap)” that causes poor insulating capability, increased leakage current, poor charge retention, and decreased device reliability. (*Id.*) To address these problems, Imai directly contradicts Horiike by actively encouraging incorporating carbon into its device and specifically locates carbon adjacent to the high-K dielectric. (*Id.* at col. 2, ln. 1-4; col. 5, ln. 2-col. 13, ln. 26; FIG. 3D (element 111); FIG. 4D (element 211); FIGS. 5C&D (elements 308 & 310); FIG. 6C (element 412); FIG. 7C (element 512); FIG. 8C (element 613).) Imai teaches that carbon suppresses leakage current and allows high capacitance and “excellent” charge retention. (*Id.* at col. 3, ln. 51-59.) Thus, one of ordinary skill in the art keeping Horiike in mind would view Imai as actively yet undesirably encouraging carbon contamination that would result in a device that suffers from leakage current and an unduly low “withstand voltage.” Conversely, that artisan keeping Imai in mind would view Horiike as undesirably removing the very element needed to counter the detriments to using high-K dielectrics, resulting in a device that suffers increased leakage current, poor insulating capability, poor charge retention, and decreased reliability.

In addition to the references’ conflicts concerning general principles, methods, and devices, the references conflict on specifics as well. For instance, Horiike alerts ordinary artisans of troubles if a single thick layer of dielectric is attempted. (Horiike at col. 2, ln.015-49.) Specifically, Horiike warns that, due to the deposition process and presence of silicon, the thick dielectric will under go reduction – causing a shortage of oxygen atoms. (*Id.* at ln. 24-38.) That shortage results in a low “withstand voltage,” variance in stoichiometry, and low dielectric constant, all of which are undesirable. (*Id.*) Horiike also warns that a thick layer will allow carbon contamination (*id.* at ln. 39-45; col. 7, ln. 60-63) -- despite removal efforts -- which further lowers the dielectric constant (*id.* at col. 7, ln. 44-62). Horiike further teaches that a thick dielectric layer will have trouble conforming to the topography of the workpiece. (*Id.* at col. 2, ln. 46-49.) Accordingly, Horiike touts the use of multiple thinner high-K dielectric layers (*id.* at col. 3, ln. 10-32; FIGS. 2&4) and admonishes that any one layer of high-K dielectric should be less than 100 angstroms in thickness (*id.* at col. 7, ln. 60-61). As for Imai, the Examiner’s characterization suggests that Imai merely passively fails to teach using multiple layers. (Office Action dated 8/20/04 at p. 7.) Applicants contend this is a mischaracterization, as Imai actively illustrates single layer high-K dielectrics (Imai at FIG. 3D (element 110); FIG. 4D (element 210);

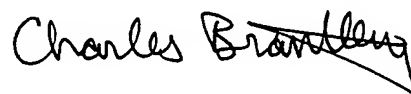
FIG. 5D (element 309); FIG. 6C (element 411); FIG. 7C (element 511); FIG. 8C (element 612)) and indicates such a layer is 200 angstroms in thickness (*id.* at col. 10, ln. 40-41; col. 11, ln. 23-25), which represents 200% of Horiike's upper limit for thickness.

Thus, in addition to the Examiner's mischaracterization of Imai demonstrating a failure to meet the burden for an obviousness rejection, the conflicts between the references demonstrate so as well. Specifically, one of ordinary skill in the art keeping Horiike in mind would view Imai as attempting to use an unduly thick dielectric that undesirably allows for contamination. Conversely, one of ordinary skill in the art keeping Imai in mind would view as Horiike as inviting unnecessary process time, money, and effort in breaking up the layering process. Such discrediting of each reference against the other -- in terms of both their general principals and their specific structures/methods -- demonstrates that an ordinary artisan would be actively discouraged from combining these references.

#### Conclusion

In light of the above amendments and remarks, Applicants submit that the claims are allowable over the rejections and applied references. Therefore, Applicants respectfully request reconsideration of the Examiner's rejections and further requests allowance of all of the pending claims. If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is requested to contact Applicants' undersigned attorney at the number indicated.

Respectfully submitted,



Dated 11/4/9

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The present Order revises the reference to the effective date of copyright restoration under the Uruguay Round Agreements Act (URAA) in the Court's August 19, 1996 Order [40 USPQ2d 1506] granting plaintiffs' Motion for Partial Summary Judgment. In the August 19, 1996 Order, the Court referred to Presidential Proclamation No. 6763 of December 23, 1994 (60 Fed. Reg. 1003 (Jan. 4, 1995)) to conclude that the date of restoration for URAA works was January 1, 1995. See Order at pages 13, 16.

[1] A later Presidential document, Proclamation No. 6780 of March 23, 1995 (60 Fed. Reg. 15845 (March 27, 1995)) clarifies that obligations of the Uruguay Round Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) relating to copyright restoration did not take effect until January 1, 1996. Proclamation No. 6780 states in pertinent part at Section 5:

c) Article 65, paragraph 1, of the TRIPs Agreement provides that no WTO member shall be obliged to apply to provisions of this Agreement until one year after the date of entry into force of the WTO Agreement with respect to the United States was January 1, 1995.

d) The statement of administrative action, approved by the Congress in section 511(a)(2) of the URAA (19 U.S.C. 511(a)(2)) provides that, "in general, copyright will be restored on the date when TRIPs Agreement's obligations take effect for the United States."

e) Accordingly, I have decided that it is necessary and appropriate, in order to implement the TRIPs Agreement and to ensure that section 514 of the URAA is properly implemented, to proclaim that the date on which the obligations of the TRIPs Agreement will take effect for the United States is January 1, 1996. Proclamation No. 6780 of March 23, 1995 (60 Fed. Reg. 15845 (March 27, 1995)).

The Court emphasizes that the present Order does not affect the Court's August 19, 1996 ruling.

IS SO ORDERED.

U.S. Court of Appeals  
Federal Circuit

United States Surgical Corp. v. Ethicon Inc.

Nos. 94-1386, -1419

Decided January 3, 1997

PATENTS

1. Patentability/Validity — Obviousness —  
In general (§115.0901)

JUDICIAL PRACTICE AND  
PROCEDURE

Procedure — Jury trials (§410.42)

Federal district court properly instructed jury on issue of obviousness in patent infringement action, since jury was correctly instructed on presumption of validity and that defendant bore burden of proving invalidity by clear and convincing evidence; and that it was necessary to consider scope and content of prior art, differences between prior art and claimed invention, level of ordinary skill in art, and objective criteria of non-obviousness, since instructions included explanation of principles to be applied in determining obviousness when invention is combination of prior art components, and since instructions were correct in law, thorough, and clearly stated.

PATENTS

2. Patentability/Validity — Obviousness —  
In general (§115.0901)

Patent construction — Claims — In general  
(§125.1301)

Federal district court need not repeat or restate every claim term in order to comply with rule that claim construction is for court rather than jury, since claim construction is matter of resolution of disputed meanings and technical scope, to clarify and if necessary explain what patentee covered by claims; for use in determination of infringement, rather than obligatory exercise in redundancy; although claim construction may occasionally be necessary in obviousness determinations, when meaning or scope of technical terms and words of art is unclear and requires resolution in order to determine obviousness, in present case none of rejected jury instructions concerning claim construction was directed to, or has been reasonably shown to affect, determination of obviousness.

PATENTS

3. Patentability/Validity — Obviousness —  
In general (§115.0901)

JUDICIAL PRACTICE AND  
PROCEDURE

Procedure — Jury trials (§410.42)

Federal district court did not commit prejudicial error by providing dictionary to jury during its deliberations in patent infringement trial in which asserted claims were held invalid for obviousness, since district court explained in post trial opinion that jury instruction to consider ordinary meaning of claim language, and general assumption that definitions of dictionary are common knowledge, with which jury is charged, support provision of dictionary, since provision of dictionary to jury, although not favored, is not grounds for new trial, and since plaintiff has offered no specifics as to words whose dictionary definitions may have adversely affected verdict of obviousness, and no suggestion that jury disregarded court's instructions on law of obviousness or plain meaning of terms used in claims and prior art.

PATENTS

4. Patentability/Validity — Obviousness —  
In general (§115.0901)

Patent construction — Claims — In general  
(§125.1301)

JUDICIAL PRACTICE AND  
PROCEDURE

Procedure — Jury trials (§410.42)

Federal district court's rejection of proposed jury instructions directed to construction of patent claims did not prejudice jury's determination of obviousness, since district court is not required to parse claims for jury in every case, whether or not there is issue in material dispute as to meaning or scope of claims, since infringement plaintiff has not shown that there are unclear or ambiguous technical terms or words of art or related aspects of claim scope whose "construction" would negate verdict of obviousness; and has not explained how any reasonable claim construction it requested would have deprived obviousness verdict of its support, and since trial court is not authorized to remove from jury factual findings underlying obviousness determination.

Particular patents — General and mechanical — Surgical clip application

5,084,057, Green, Bolanos, Young, McGarry, Heaton, and Ratcliff, apparatus

and method for applying surgical clips in laparoscopic or endoscopic procedures, judgment that claims 1, 2 and 7 are invalid for obviousness affirmed.

5,100,420. Green, Bolanos, Young, McGarry, Heaton, and Ratcliff, apparatus and method for applying surgical clips in laparoscopic or endoscopic procedures, judgment that claim 1 is invalid for obviousness affirmed.

On remand from the U.S. Supreme Court Action by United States Surgical Corp. against Ethicon Inc. and Johnson & Johnson Hospital Services Inc. for patent infringement. The U.S. District Court for the District of Connecticut entered judgment for defendants on jury verdicts that plaintiff's patent no. 5,100,420 is infringed but invalid for obviousness, and that plaintiff's patent no. 5,084,057 is not infringed and invalid for obviousness. On appeal, the U.S. Court of Appeals for the Federal Circuit affirmed without opinion pursuant to Fed. Cir. R. 36. Following grant of certiorari, the U.S. Supreme Court vacated that affirmance and remanded for further consideration in light of its decision in *Markman v. Westview Instruments Inc.* (38 USPQ2d 1461). On remand, district court's judgment is affirmed on ground of invalidity of patents in suit based on obviousness.

William E. McDaniels, J. Alan Galbraith, and David S. Blatt, of Williams & Connolly, Washington, D.C.; Basam E. Nabulsi, Thomas R. Bremer, and John C. Andres, Norwalk, Conn., for plaintiff-appellant.

David F. Dobbins, Gregory L. Diskant, and Eugene M. Gelernter, of Patterson, Belknap, Webb & Tyler, New York, N.Y., for defendants/cross-appellants.

Before Newman, circuit judge, Bennett, senior circuit judge and Rader, circuit judge.

Newman, J.

The court's prior judgment of this appeal and cross-appeal was vacated by the Supreme Court and remanded "for further consideration in light of *Markman v. Westview Instruments, Inc.*, 517 U.S. (1996). *U.S. Surgical Corp. v. Ethicon, Inc.*, 116 S. Ct. 1562 (1996). Our prior judgment affirmed the judgment of the United States District Court for the District of Connecticut, entered on jury verdicts that claim 1 of

U.S. Surgical's United States Patent No. 5,100,420 (the '420 patent) is infringed but invalid for obviousness, and that claims 1, 2, and 7 of United States Patent No. 5,084,057 (the '057 patent) are not infringed and are invalid for obviousness. The issue of inequitable conduct during patent prosecution was decided before trial, by summary judgment in favor of U.S. Surgical. Each of U.S. Surgical and Ethicon appealed the rulings adverse to it. After full briefing and oral argument this court entered judgment pursuant to Federal Circuit Rule 36:

Rule 36: Judgment of affirmance without opinion.—

The court may enter a judgment of affirmance without opinion, citing this rule, when it determines that any of the following circumstances exist:

(a) the judgment, decision or order of the trial court appealed from is based on findings that are not clearly erroneous;

(b) the evidence in support of a jury verdict is sufficient;

(c) summary judgment, directed verdict, or judgment on the pleadings is supported by the record;

(d) the decision of an administrative agency warrants affirmance under the standard of review in the statute authorizing the petition for review; or

(e) a judgment or decision has been entered without an error of law; and an opinion would have no precedential value.

Appeals whose judgments are entered under Rule 36 receive the full consideration of the court, and are no less carefully decided than the cases in which we issue full opinions. The Rule permits the court to dispense with issuing an opinion that would have no precedential value, when the circumstances of the Rule exist. See *Taylor v. McKeithen*, 407 U.S. 191, 194 n.4 (1972) ("We, of course, agree that the courts of appeals should have wide latitude in their decisions of whether or how to write opinions. That is especially true, with respect to summary affirmances.")

Seven weeks after this decision, reported at 48 F.3d 1237 (Fed. Cir. 1995) (Table), for which rehearing and rehearing *en banc* were denied, the Federal Circuit decided *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995) (*en banc*). The Supreme Court granted certiorari in *Markman* and also upon U.S. Surgical's petition. After deciding the *Markman* appeal, reported at 517 U.S., 116 S. Ct. 1384, 38 USPQ2d 1461 (1996), the Court instructed the Federal Circuit to give further consideration to U.S. Surgical's case in light of the

<sup>1</sup>U.S. Surgical Corp. v. Ethicon, Inc., No. 5:92 CV 00134 (AVC), (D. Conn. Feb. 11, 1993 (Summary Judgment); February 18, 1994 (Judgment Order); June 9, 1994 (Ruling on Post-trial Motions)).



ical's United States Patent No. (the '420 patent) is infringed but obviousness, and that claims 1, 2, nited States Patent No. 5,084,057 patent) are not infringed and are obviousness. The issue of inequity during patent prosecution was fore trial, by summary judgment U.S. Surgical. Each of U.S. Surgical appealed the rulings adverse r full briefing and oral argument entered judgment pursuant to Fed-it Rule 36:  
36: Judgment of affirmance with-  
ion.—  
court may enter a judgment of  
ce without opinion, citing this  
en it determines that any of the  
g circumstances exist:  
ie judgment, decision or order of  
court appealed from is based on  
that are not clearly erroneous;  
ie evidence in support of a jury  
s sufficient;  
immary judgment, directed ver-  
judgment on the pleadings is sup-  
y the record;  
ie decision of an administrative  
warrants affirmance under the  
f of review in the statute authoriz-  
petition for review; or  
judgment or decision has been  
without an error of law;  
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ceive the full consideration of the  
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when the circumstances of the  
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1237 (Fed. Cir. 1995) (Table), for  
aring and rehearing *en banc* were  
e Federal Circuit decided *Mark-*  
*stview Instruments, Inc.*, 52 F.3d  
SPQ2d 1321 (Fed. Cir. 1995) (*en*-  
Supreme Court granted certiora-  
man and also upon U.S. Surgical's  
fter deciding the *Markman* ap-  
ted at 517 U.S., 116 S. Ct. 1384,  
d 1461 (1996), the Court instruct-  
eral Circuit to give further consid-  
U.S. Surgical's case in light of the

Court's decision in *Markman*. We have done so.  
The judgment of the district court is af-  
firmed, on the ground of invalidity of the  
'420 and '057 patents, based on obviousness.  
We do not reach the issues of infringement  
and the conditional cross-appeal of the issue  
of inequitable conduct. See *Consolidated  
Aluminum Corp. v. Foseco Int'l Ltd.*, 910  
F.2d 804, 814, 15 USPQ2d 1481, 1489  
(1990) ("a party may defend a judgment on  
any ground properly raised below") (citing  
*Washington v. Yakima Indian Nation*, 439  
U.S. 463, 476 n.20 (1979)); *Lough v. Bruns-*  
*wick Corp.*, 86 F.3d 1113, 1123, 39 USPQ2d  
1100, 1107 (Fed. Cir. 1996). ("No further  
public interest is served by our resolving an  
infringement question after a determination  
that the patent is invalid."). We now fully  
explain our decision.

The U.S. Surgical Inventions

The inventions claimed in the '420 patent  
and its continuation-in-part the '057 patent  
are for a surgical instrument for ligating  
blood vessels and other tissues during endo-  
scopic surgery, by applying multiple ligating  
clips in sequence.  
Endoscopic surgery is a procedure where-  
by instead of opening the abdomen or other  
body cavity by incision to provide open ac-  
cess to the surgical site, the surgery is per-  
formed by inserting the surgical instruments  
into the body through small tubes called  
trocars. The small size of the incisions that  
accommodate the trocars results in less tis-  
sue damage, less pain, and faster healing  
than for traditional open surgery. In per-  
forming endoscopic surgery the body cavity  
is inflated with a gas, called an insufflating  
gas, to provide working space. For most  
procedures today a miniature video camera  
is used to televise the surgical site, the en-  
larged video image appearing upon an exter-

nal screen and guiding the surgeon or surgi-  
cal team in manipulating the instruments  
through the trocars.  
Endoscopic surgery was in somewhat lim-  
ited use for many years, having been used  
mostly for the ligation of fallopian tubes, the  
surgeon viewing the site through an eyepiece.  
Endoscopic procedures experienced rapid ex-  
pansion after about 1989, particularly for  
gallbladder removal. Witnesses disputed at  
trial whether the expansion was due to the  
development of the miniature video camera  
or the development of U.S. Surgical's endo-  
scopic multiple clip applier.  
During both endoscopic and open surgery,  
blood vessels may be closed and tissues  
clamped using small "U" shaped clamps  
called ligating clips. Ligating clips are ap-  
plied by an instrument that positions the clip  
about the tissue or vessel to be secured and  
then compresses the clip. When initially de-  
veloped, ligating clip instruments were capa-  
ble of being loaded with only one clip at a  
time, and required reloading between each  
application. Then U.S. Surgical developed a  
ligating clip applier for open surgical use  
that applied multiple clips in succession,  
without reloading the instrument. This in-  
strument, having the brand name "Premium  
Surgiclip," is the subject of United States  
Patent No. 5,030,226 (the '226 patent). The  
Premium Surgiclip and the '226 patent are  
prior art to the '420 and '057 patents in suit,  
and were the subject of extensive testimony  
at trial.  
At trial witnesses explained the subse-  
quent development of the instrument of the  
patents in suit, a ligating clip applier for  
endoscopic use that applies multiple clips in  
succession without withdrawing and reload-  
ing the instrument. U.S. Surgical's instru-  
ment, having the brand name EndoClip, was  
the first multiple clip applier for endoscopic  
use. The instrument is depicted in the '420  
patent as follows:

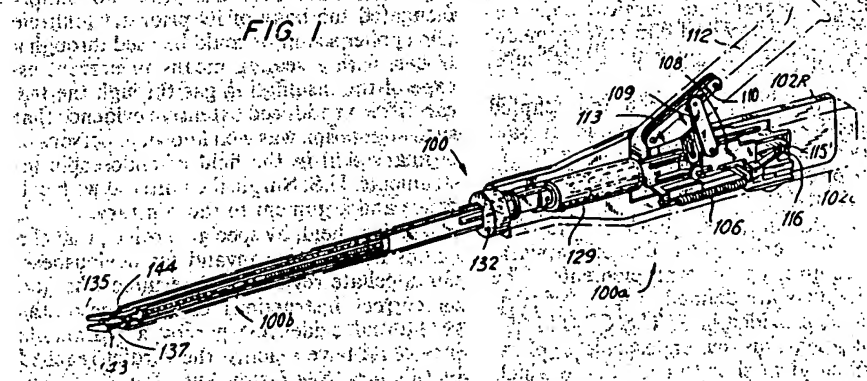


Fig. 1 of '420 patent.

The instrument is depicted in the '057 patent with a different handle, as follows:

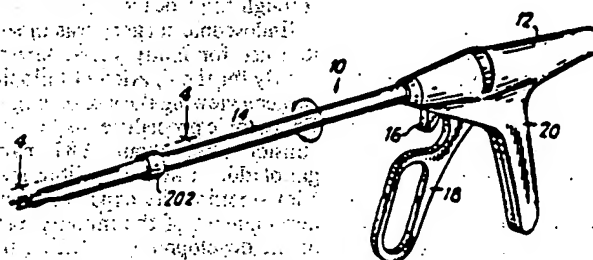


Fig. 1 of '057 patent.

It is seen that these instruments have an elongated shank that holds the ligating clips and is shaped for endoscopic use through a trocar. After insertion into the body cavity a clip is pushed into position in the jaws using controls on the handle, and the clip is applied to the tissue to be ligated by closing the jaws using controls on the handle. The jaws are then opened and the next clip is pushed into position. Thus successive clips may be applied without withdrawing the instrument from within the body.

Claim 1 of the '420 patent is directed to the combination of the trocar and the clip applier, each component having defined limitations. Claim 1 is the only '420 patent claim in suit:

1. In combination:

a) a trocar having a cannula, and valve means for sealing said cannula, said cannula being adapted for entry into a body cavity;

b) an endoscopic clip applier having:

i) a frame;

ii) an endoscopic portion defining a longitudinal axis and extending distally from said frame, said endoscopic portion being insertable into said cannula through said valve means in sealing engagement therewith, said endoscopic portion further including a plurality of surgical clips disposed in an array and clip closing means for sequentially closing said surgical clips; and

iii) seal means associated and adapted to cooperate with at least one of said endoscopic portion and said frame to obstruct passage of gaseous media from the body cavity.

Claim 1, the broadest claim of the '057 patent, also describes the endoscopic apparatus as comprising several elements. The claim elements are defined in terms of their function, as provided in 35 U.S.C. §112 ¶6:

1. An apparatus for endoscopic application of surgical clips to body tissue which comprises:

a) frame means;

b) endoscopic means connected to said frame means of generally elongated configuration and extending distally from said frame means and including:

i) means for storing a plurality of surgical clips;

ii) means for individually advancing said clips to the distal portion of said endoscopic means for positioning adjacent the body tissue to be clipped;

iii) means for at least partially closing said clip at least sufficient to grip the body tissue after the clip has been advanced distally to said distal portion of said endoscopic means; and

iv) gaseous sealing means.

Claim 2 of the '057 patent specifies the use of silicon grease as the gaseous sealing means of clause iv, and claim 7 is directed to a disposable device as in claim 1.

Ethicon's defense that the claims are invalid for obviousness was based on the ground that U.S. Surgical had merely adapted to endoscopic use its own, prior art multiple clip applier, the Premium Surgiclip of the '226 patent, by known and routine adaptation. Thus Ethicon presented evidence, and argument that U.S. Surgical had simply elongated the body of its prior art multiple clip applier so that it could be used through a trocar, with a sealing means to prevent escape of the insufflating gas through the trocar. Ethicon adduced extensive evidence that such adaptation was well known to persons of ordinary skill in the field of endoscopic instruments. U.S. Surgical countered with evidence and argument to the contrary.

The jury held, by special verdicts, that the claims in suit were invalid for obviousness. On appellate review we determine whether, on correct instructions of law, there was substantial evidence whereby a reasonable jury could have reached the verdict reached by this jury. See *Litton Sys., Inc. v. Honeywell, Inc.*, 87 F.3d 1559, 1566, 39 USPQ2d



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 means and including;  
 or storing a plurality of surgi-

for individually advancing  
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 for at least partially closing  
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1321, 1324 (Fed. Cir. 1996) ("Substantial evidence describes that minimum quantum of evidence from which a jury might reasonably afford relief."); *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 72 F.3d 857, 862, 37 USPQ2d 1161, 1163 (Fed. Cir. 1995) ("Substantial evidence is such relevant evidence, on the record as a whole, as could be accepted by a reasonable mind as adequate to support the verdict.") Conflicting evidence and argument must be viewed as resolved favorably to the party in whose favor the jury found. The reviewing court must give appropriate deference to the jury's choices in weighing the evidence, in deciding between opposing positions, and in drawing factual inferences. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989) ("the appellate court's function is exhausted when that evidentiary basis [of the jury's verdict] becomes apparent, it being immaterial that the court might draw a contrary inference or feel that another conclusion is more reasonable.") (quoting *Lavender v. Kurn*, 327 U.S. 645, 653 (1946)); *Medtronic, Inc. v. Intermedics, Inc.*, 799 F.2d 734, 742, 230 USPQ 641, 646 (Fed. Cir. 1986), cert. denied, 479 U.S. 1033 (1987).

#### The Prior Art

As we have remarked, Ethicon's position was that U.S. Surgical had simply elongated its prior art multiple ligating instrument so that it could be inserted through a trocar, and used known endoscopic sealing mechanisms to inhibit escape of the insufflating gas through the trocar. Expert witnesses testified that these modifications were well known to persons of ordinary skill in the art of endoscopic instruments. The witnesses presented several prior art patents, and exhibited many actual instruments, all having the common endoscopic characteristics of an elongated body and sealable engagement with the trocar.

The district court mentioned, in the opinion accompanying the denial of post-trial motions, that U.S. Surgical's technical expert testified that there were approximately forty different prior art multiple clip appliers for conventional open surgery. He testified that at least four of them — the Premium Surgiclip of the '226 patent and the multiple clip appliers shown in the Montgomery patent, the Peters patent, and the Lachakar patent — embodied all of the elements of the '420/'057 claims except for the elongated body and sealing means. He testified that an elongated body and sealing means are characteristics of all endoscopic surgical instru-

ments. In evidence were a variety of actual instruments for endoscopic surgery, all having these characteristics. These endoscopic instruments included graspers, scissors, dissectors, and single clip appliers. All had an elongated body and were adapted for sealing engagement with the trocar.

Also in evidence were references describing prior endoscopic devices for the application of multiple fasteners other than ligating clips. U.S. Patent No. 3,870,048 to Yoon showed an applicator for multiple elastic rings for ligating fallopian tubes, stating that "[i]t is possible to load suture ring clips within the applicator in end-to-end series fashion. . . . This permits a number of clips to be applied during a procedure without the need of having to withdraw the applicator from the surgical field in order to load another clip into the applicator." U.S. Patent No. 4,226,239 to Polk also showed an instrument for endoscopic application of multiple ligating rings. The prior art also included at least one endoscopic multiple staple applier, Patent No. 4,944,443 to Oddsen. All of the endoscopic instruments for applying multiple fasteners had the common characteristics of elongation for use through a trocar, and most were sealed against escape of the gas through the trocar. Several references showed the use of silicon grease, as specified in claim 2 of the '057 patent, or valves, as specified in claim 1 of the '420 patent, to maintain the seal.

The testimony of U.S. Surgical's technical expert that the elongated body and the seal are common characteristics of endoscopic instruments was described by Ethicon as a concession of great weight. This evidence was stressed at trial, as Ethicon pressed its argument that U.S. Surgical had simply adapted its '226 patent multiple clip applier for endoscopic use, and that it was obvious to do so, pointing to many other instruments that had been adapted in the same way. U.S. Surgical points out that this same expert and several other expert witnesses testified about the difficulties of designing the '420/'057 endoscopic multiple clip applier and the time and cost involved. We take note of the conflicting testimony and the opposing expert opinions of witnesses for these parties, and of the lengthy explorations by these witnesses of this technology and the development and characteristics of these surgical instruments.

In comparing the '420/'057 instruments with the prior art instruments, Ethicon's patent expert testified that the prior art '226 patent was the closest prior art and that the relevant elements of the structure of the '226 patent "were adopted into the subject matter of the '057 and '420 patent applications."

Ethicon's technical expert pointed out to the jury all of the similarities of the structure and mechanisms between the device of the '226 patent and the '420/'057 patents. He pointed to the jaws to hold the clip, the pusher for advancing a stored clip to the

jaws, the grooves in the face of the jaws to receive the clip, and the mechanism for closing the clip about the tissue to be ligated. The drawings of the jaws in the '226 patent and in the '420/'057 patents show this similarity:

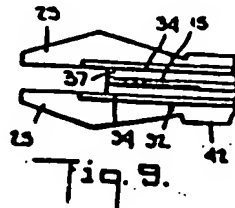


Fig 9 of 226 Patent

Witnesses testified that the operation of the '226 instrument and the '420/'057 patents was essentially the same. It was explained that in both the '226 and the '420/'057 instruments the jaw blade, clip carrier, and pusher bar are all enclosed in a channel assembly from which the jaws protrude at the end. In the '226 patent the applicator is described in the Abstract as:

The surgical clip applicator has a pusher bar which positions the foremost clip from a clip carrier into a ready-to-fire position between the jaws prior to squeezing of the handles together. When the applicator is fired, the previously positioned surgical clip can be crimped about a vessel and when the jaws are released, a new clip is placed between the jaws for the next firing. A channel assembly moves over the jaws to close the jaws while the pusher bar

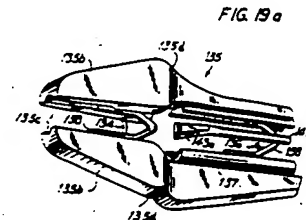


Fig 19a of 420 Patent

is retracted into the clip carrier for delivering the foremost clip from the carrier upon release of the handles.

Referring to Fig. 4 of the '226 patent, it was explained at trial that the pusher bar (35) moves a clip (33) into the channels in the faces of the jaws (25). When a clip is in the jaws and the handles are closed, the external channel (38) moves forward over the beveled portion of the jaws, which, by virtue of their beveled shape, are squeezed together by the external channel, thus closing the clip. At the same time, the pusher bar moves back to engage the next clip in line. When the handle is released the channel withdraws, the jaws open and release the clipped tissue, and the pusher bar moves forward, positioning the next clip into the jaws. The operating components are shown in the patent as follows:

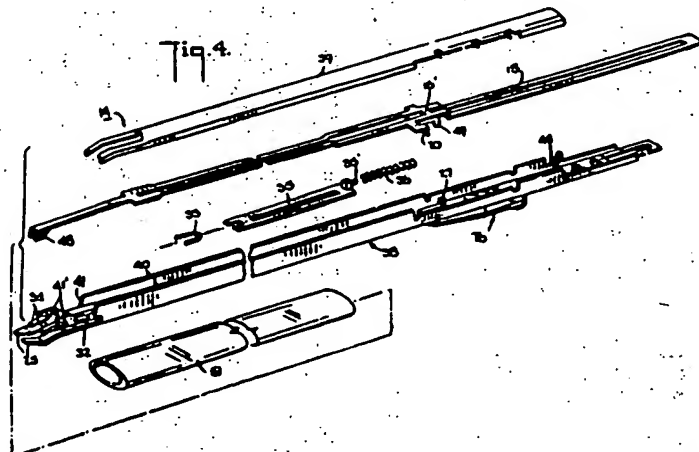
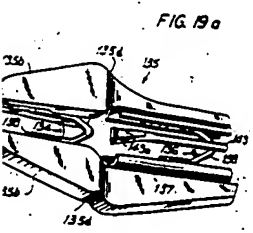


Fig 4 of 226 Patent



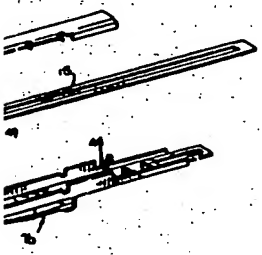
the grooves in the face of the jaws to receive the clip, and the mechanism for closing the clip about the tissue to be ligated. Drawings of the jaws in the '226 patent and the '420/'057 patents show this similarity:



9a of 420 Patent

racted into the clip carrier for delivery of the foremost clip from the carrier upon release of the handles.

According to Fig. 4 of the '226 patent, it was established at trial that the pusher bar (35) moves a clip (33) into the channels in the jaws (25). When a clip is in the jaws and the handles are closed, the external channel (38) moves forward over the beveled portion of the jaws, which, by virtue of their shape, are squeezed together by the channel, thus closing the clip. At the same time, the pusher bar moves back to the next clip in line. When the handle is released, the channel withdraws, the jaws release the clipped tissue, and the pusher bar moves forward, positioning the next clip into the jaws. The operating components shown in the patent are as follows:



In the '226 patent the clip carrier is described as "an elongated channel having a pair of side walls or rails between which the clips are slidably guided, a pusher which

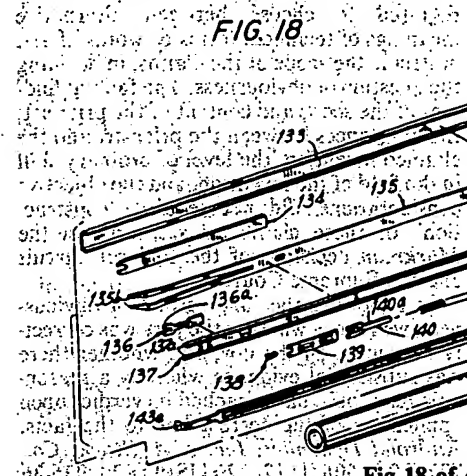


Fig 18 of 420 Patent

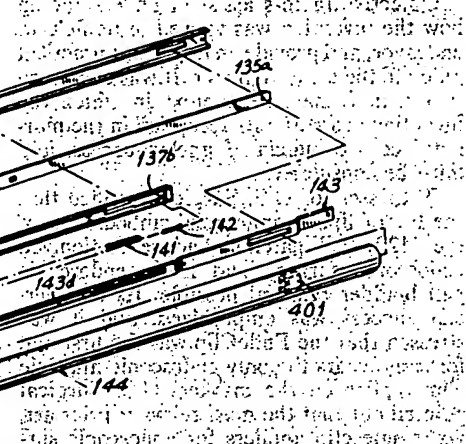
It was explained that the pusher bar (143) moves a ligating clip (138) into the channels in the faces of the jaws (135-b). When a clip is in the jaws and the handles are closed, the external channel (133) moves forward over the beveled portion of the jaws, squeezing them together and closing the clip.

To counter this evidence of similarity, U.S. Surgical witnesses testified that the '420/'057 instrument was not a routine adaptation of a prior instrument and stressed the long development time and engineering difficulties involved in the conversion of the '226 device to endoscopic use. Ethicon challenged these arguments and their factual basis on cross-examination, and elicited testimony that the development time related primarily to unclaimed features of the handle.

There was testimony about the seal and how it was achieved. In its infringement case, U.S. Surgical argued that "valve means" in the '420 patent included any known means for sealing the clip applicator in the trocar, including valves and gaskets. U.S. Surgical argued at trial as stated in its proposed jury instruction construing this term for infringement purposes:

The structure for performing this [valve means] function includes all such structures contained in trocars known in the art at the time the '420 Patent Application was filed. U.S. Surgical presented testimony to this effect at trial, thus providing substantial ba-

slides between the rails, and a spring for biasing the pusher in the forward direction." Col. 4, lines 45-54. The corresponding assembly, shown in Fig. 18 of the '420 patent, was the subject of comparative testimony:



sis for the jury to find that the "valve means" of the '420 patent was known in the prior art. U.S. Surgical does not now dispute that the "valve means" of its '420 patent is found in prior art endoscopic instruments.

In the course of the extensive explanation and comparisons at trial of the prior art devices and the '420/'057 devices, there was no dispute concerning the content of the references or the structures that they described. There was no dispute concerning the structures described in the '420/'057 patents, or concerning the meaning of technical terms or words of art as used in the prior art or in the patents in suit. The jury was instructed that the technical terms had their plain meaning, as the district court mentioned in its opinion on the post-trial motions. U.S. Surgical did not proffer a particular "construction" of technical terms in order to distinguish the claimed inventions from prior art devices. Neither party departed from the plain meaning of the words that were used in the claims and in the specifications, and in the prior art. Although U.S. Surgical has raised on this appeal the issue of "claim construction," as we shall discuss *post*, there was no argument at trial as to the meaning of technical terms or words of art insofar as they concern the determination of obviousness.

There was opinion evidence on both sides of the question of obviousness. We turn to the objective factors for as the district court instructed the jury, such evidence must be

considered in the determination of obviousness:

#### Objective Factors

Objective factors assist in understanding how the invention was viewed in its field of endeavor, and provide an important practical guide to the decisionmaker. It was explained to the jury that the context in which the invention arose and its reception in the marketplace are indicia of unobviousness, and must be considered.

Witnesses for U.S. Surgical testified that the EndoClip, a commercial embodiment of the '420/'057 patents, had revolutionized endoscopic surgery and made endoscopic gall bladder removal possible. Its commercial success was emphasized, and it was stressed that the EndoClip was the first and for some years the only endoscopic multiple clip applier on the market. U.S. Surgical pointed out that the most relevant prior art, viz. single clip appliers for endoscopic surgery and multiple clip appliers for open surgery, had existed for more than a decade before U.S. Surgical produced the EndoClip for endoscopic surgery. U.S. Surgical presented evidence of the rapid acceptance and adoption of new endoscopic procedures, based on its new multiple clip applier.

Witnesses for Ethicon testified that the growth of endoscopic surgery was due to the miniature video camera, not the multiple clip applier. They testified that before a tiny camera was available to televise images of the abdominal cavity, whereby a team of surgeons could operate with a common view of the surgical field, endoscopic surgery was largely limited to ligation of fallopian tubes, a simple procedure performed by a surgeon peering through an eyepiece. According to Ethicon, U.S. Surgical's EndoClip was developed for and had its only use for tubal ligation, and its later commercial growth was due to the sheer luck of being on the market when endoscopic surgery underwent its rapid expansion upon the capability of televising from inside the body.

Thus U.S. Surgical characterized its '420/'057 multiple clip applier as a pioneering advance in the field of endoscopic surgery, while Ethicon described the '420/'057 instrument as an obvious adaptation of a prior art multiple clip applier, whose commercial success was due to unrelated factors. These conflicting arguments were fully presented at trial. Witnesses, including surgeons, supported both sides. The jury was presented with questions of credibility and weight as well as factual disputes, as the jury decided whether the inventions of the claims

in suit would have been obvious to a person of ordinary skill in the field of the invention at the time the invention was made. Although there were indeed questions of credibility and weight of evidence, the jury was not required to choose between alternative meanings of technical terms or words of art, or decide the scope of the claims, in deciding the question of obviousness. The factual findings of the scope and content of the prior art, the differences between the prior art and the claimed invention, the level of ordinary skill in the field of the invention, and the objective considerations, did not require "construction" of these claims as set forth in the *Markman* decisions of the Federal Circuit and the Supreme Court.

In reviewing the jury verdict of obviousness, we review whether the jury was correctly instructed on the law, and whether there was substantial evidence whereby a reasonable jury could have reached its verdict upon application of the correct law to the facts, *Railroad Dynamics, Inc. v. A. Stucki Co.*, 727 F.2d 1506, 1512, 220 USPQ 929, 935-36 (Fed. Cir.), cert. denied, 469 U.S. 871 (1984), recognizing that invalidity must be proved by clear and convincing evidence. *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893, 221 USPQ 669, 673 (Fed. Cir. 1984). Thus we turn to the law, as presented at trial and as instructed by the trial judge.

#### The Jury Instructions

Jury instructions are reviewed for correctness, with due attention to their clarity, objectivity, and adequacy, taken as a whole. See *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1570, 24 USPQ2d 1401, 1411 (Fed. Cir. 1992) ("The correctness of a jury instruction . . . is reviewed on appeal to determine whether, on the whole, the jury instructions were adequate to ensure that the jury fully understood the legal issues for each element of the case."); *Trademark Research Corp. v. Maxwell Online, Inc.*, 995 F.2d 326, 339 (2d Cir. 1993) ("A trial court's improper charge constitutes reversible error only 'when jury instructions, taken as a whole, give the jury a misleading impression or inadequate understanding of the law.'") (quoting *Carvel Corp. v. Diversified Management Group, Inc.*, 930 F.2d 228, 232 (2d Cir. 1991)).

[1] The jury was correctly instructed on the presumption of validity; and that Ethicon bore the burden of proving invalidity by clear and convincing evidence. The jury was correctly instructed that in determining whether the inventions of the '420 and '057 patents

would have been obvious to a person of ordinary skill in the field of the invention at the time the invention was made. Although there were indeed questions of credibility and weight of evidence, the jury was not required to choose between alternative meanings of technical terms or words of art, or the scope of the claims, in deciding on obviousness. The factual findings on the scope and content of the prior art, the differences between the prior art and the invention, the level of ordinary skill in the art of the invention, and the objective criteria, did not require "construction" of these claims as set forth in the instructions in decisions of the Federal Circuit and the Supreme Court.

In reviewing the jury verdict of obviousness, the court reviewed whether the jury was correctly instructed on the law, and whether there was substantial evidence whereby a reasonable jury could have reached its verdict upon application of the correct law to the facts. See *Dynamics, Inc. v. A. Stucki Co.*, 1506, 1512, 220 USPQ 929, 935-36 (11th Cir., cert. denied, 469 U.S. 871 (1984)). The court recognized that invalidity must be supported by clear and convincing evidence. *Immer Corp. v. Computervision Corp.*, 2 F.2d 888, 893, 221 USPQ 669, 671 (1st Cir. 1984). Thus we turn to the instructions presented at trial and as instructed by the court.

#### Instructions

The instructions are reviewed for correctness, due attention to their clarity, objectivity, and adequacy, taken as a whole. See *Tree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1570, 24 USPQ2d 1101 (Fed. Cir. 1992) ("The correctness of the instruction . . . is reviewed on appeal to determine whether, on the whole, the instructions were adequate to ensure that the jury fully understood the legal issues presented in the case."); *Trademark Corp. v. Maxwell Online, Inc.*, 995 F.2d 339 (2d Cir. 1993) ("A trial court's proper charge constitutes reversible error only when jury instructions, taken as a whole, give the jury a misleading impression of the law or an inadequate understanding of the issues presented. *Carvel Corp. v. Diversified Food Products Group, Inc.*, 930 F.2d 228, 232 (1st Cir. 1991).")

The jury was correctly instructed on the question of validity, and that Ethicon bore the burden of proving invalidity by clear and convincing evidence. The jury was correctly instructed that in determining whether the '420 and '057 patents

were invalid based on obviousness, it was necessary to consider the scope and content of the prior art, the differences between the prior art and the claimed invention, the level of ordinary skill in the art, and the objective criteria of unobviousness. The court correctly explained the *Graham* factors. See *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). For example, in determining the level of ordinary skill in the art the jury was instructed to consider

evidence submitted by the parties to show:

One, the educational level of active workers in the field.

Two, the types of problems encountered in the art.

Three, the nature of the prior art solutions to those problems.

Four, the activities of others.

Five, the rapidity with which innovations are made in the art.

And six, the sophistication of the technology involved.

The jury instructions included explanation of the principles to be applied in determining obviousness when the invention is a combination of prior art components. The court instructed that the prior art must show not only all of the elements of the claimed combination, but must contain some "teaching, suggestion or incentive" to a person of ordinary skill to combine the known elements in the way that U.S. Surgical combined them. In order to prove obviousness, the defendants must prove, again by clear and convincing evidence, that one of ordinary skill in the art would have found in the prior art references some teaching, suggestion or incentive to combine the prior art references in the way that U.S. Surgical did in its invention.

The jury instructions stressed that the prior art, to be invalidating, must sufficiently teach or direct a person of ordinary skill how to obtain the result reached by the patentee.

Additionally, if you do find a teaching in the prior art that would motivate one of ordinary skill in the prior art to make the clip applicator claimed in the '057 and '420 patents, you must also determine whether there was sufficient teaching or direction in the prior art of how to obtain or build the claimed clip applicator such that a person of ordinary skill in the art would have a reasonable likelihood of success in making the invention. In other words, in order to find obviousness, you must find not only that the prior art would teach one of ordinary skill to try the combination of known elements, but also that the prior art would

sufficiently teach or direct one of ordinary skill how to obtain the desired result.

The jury was instructed that in determining obviousness it was to consider the claim as a whole, and that it did not suffice if the individual elements of the invention were known in the prior art.

The reason you must consider the claim as a whole is because there is no dispute that U.S. Surgical's invention is comprised of individual elements which were known in the prior art. The fact that U.S. Surgical's inventions incorporate or combine elements already known in the prior art does not render its patents invalid. Patents can be granted on devices that contain a combination of various elements that are well known in the prior art. U.S. Surgical's claim is that it invented the combination of those elements for the first time in the endoscopic multiple clip applicator claimed in the patents in suit.

The instructions on the law of obviousness occupied eight pages of trial transcript. They were correct in law, thorough, and clearly stated. U.S. Surgical now argues that other instructions that it requested should also have been given, and that their omission requires a new trial. The district court explained its denial of these requests in its opinion on the post-trial motions.

U.S. Surgical had requested that the court read to the jury the sentence of 35 U.S.C. §103(a) that states: "Patentability shall not be negated by the manner in which the invention was made," accompanied by the instruction that the jury should give no weight to Ethicon's evidence of "how long or short a time it took to make [the invention]" and "how obvious U.S. Surgical's invention may have seemed to U.S. Surgical's own inventors." The court denied the request. We do not discern reversible error in this denial, for the rejected instruction was encompassed in the instructions that were given, was the subject of expert testimony, and was included in the argument. The court did not commit error in denying an instruction that gave weight to one of the several aspects that were before the jury, and was reasonably viewed as cumulative in the context of the instructions that were given.

U.S. Surgical also requested an instruction that the '226 patent was cumulative prior art and thus did not have to be cited to the patent examiner. In its pre-trial consideration of the issue of inequitable conduct, the court, through a special master, had concluded that the '226 patent was cumulative in the circumstances and on the law that then applied in the examination of patents. Whatever the relevance of this point to the issue of

inequitable conduct, which had been decided in favor of U.S. Surgical, the '226 patent was correctly treated as prior art in this litigation. The denial of this instruction is not grounds for a new trial.

U.S. Surgical also requested the instruction that even if the jury found the absence of the secondary consideration of long-felt need, that was "in no way suggestive of obviousness or invalidity." The instruction that was given on the secondary considerations was:

In making these three determinations [the *Graham* factors] you must also consider other surrounding circumstances which are called secondary considerations. These include:

One, whether the alleged invention was commercially successful;

Two, whether the alleged invention satisfied a long-felt need in the art;

Three, whether others were unsuccessful in making the alleged invention;

Four, whether the alleged invention was copied by others in the art;

Five, whether the alleged invention received praise from others in the art;

Six, whether the alleged invention departed from other principles of the art.

In order to determine that secondary considerations such as commercial success are evidence of non-obviousness, there must be a causal connection between the patented features of the invention and the commercial success of the device. If commercial success is attributable to the patented features, then it is evidence of non-obviousness.

U.S. Surgical's requested instruction concerning long-felt need related to the weight to be given to a fact whose existence, and significance, was disputed at trial. The issue of the objective factors was complex and hard-fought at trial, leaving areas of dispute, weight, and perhaps credibility. We discern no error in the court's refusal to comment on a specific aspect, having instructed the jury on all aspects.

U.S. Surgical also requested the instruction that prior art that teaches away from the patented invention is evidence of nonobviousness. That subject was comprehended in the above-quoted instruction that the jury should consider "Six, whether the alleged invention departed from other principles of the art," an argument whose substance had been debated at trial. The refusal of this instruction, in light of the full instructions that were given, is not grounds for a new trial.

U.S. Surgical also states that the district court should have given a curative instruc-

tion to counter Ethicon's suggestion that the patents in suit improperly hindered competition. The record shows Ethicon's persistent and improper innuendos. However, U.S. Surgical reasonably countered this aspect with evidence and argument concerning the purpose of the patent system. Review of the record leads us to conclude, as apparently did the district court, that this tactic did not prejudice the outcome. See *City of New York v. Pullman, Inc.*, 662 F.2d 910, 917 (2d Cir. 1981) ("The district court is not obliged to charge every contention made by the parties at trial, as long as the charge itself, taken as a whole, is fundamentally fair.") (citations omitted), *cert. denied*, 454 U.S. 1164 (1982). The denial of these instructions (and others offered by both sides) was not a miscarriage of justice, and does not establish reversible error or grounds for a new trial.

U.S. Surgical also argued that its requested instructions construing the claims should have been given, and that the absence of "claim construction" by the district court required a new trial. In accordance with the Court's remand for further consideration in light of *Markman*, we have again reviewed the requested instructions to determine whether any instructions that were improperly refused could reasonably have prejudiced the jury's verdict of invalidity.

In evaluating the refused instructions, we look first at the instructions on claim construction that were given. The issue was interpretation of these means-plus-function claims and their application to find if there was infringement by the Ethicon devices. The district court instructed the jury how to interpret means-plus-function claim elements, and how to apply these claim elements to the accused devices, as follows:

Now, in interpreting the means plus function claim elements, you must determine the following:

One, what function is called for by the claim element, and

Two, what structure, or means, is described in the patent specifications for performing the stated function.

A means plus function claim is only infringed if:

One, the function of the accused device is identical to the function disclosed in the claim element of the patent; and

Two, the structure which performs that function in the accused device is the same as, or the equivalent of, the structure described in the patent specifications.

The second of these two steps requires you to determine whether the accused device includes the same structure as described in the patent or its equivalent. You



to counter Ethicon's suggestion that the elements in suit improperly hindered competition. The record shows Ethicon's persistent improper innuendos. However, U.S. District Court reasonably countered this aspect of the evidence and argument concerning the proper scope of the patent system. Review of the record leads us to conclude, as apparently the district court, that this tactic did not prejudice the outcome. See *City of New York v. Pullman, Inc.*, 662 F.2d 910, 917 (2d Cir. 1981) ("The district court is not obliged to charge every contention made by the party at trial, as long as the charge itself, taken as a whole, is fundamentally fair.") (citations omitted), *cert. denied*, 454 U.S. 1164 (1982). The denial of these instructions (and the arguments offered by both sides) was not a miscarriage of justice, and does not establish reversible error or grounds for a new trial. U.S. Surgical also argued that its requested instructions construing the claims should have been given, and that the absence of claim construction by the district court required a new trial. In accordance with the court's remand for further consideration in *Markman*, we have again reviewed the requested instructions to determine whether any instructions that were improperly refused could reasonably have prejudiced the jury's verdict of invalidity. In evaluating the refused instructions, we first at the instructions on claim construction that were given. The issue was interpretation of these means-plus-function claims and their application to find if there was infringement by the Ethicon devices. The district court instructed the jury how to interpret means-plus-function claim elements, and how to apply these claim elements to the accused devices, as follows:

Now, in interpreting the means plus function claim elements, you must determine the following:

- One, what function is called for by the claim element, and
- Two, what structure, or means, is described in the patent specifications for performing the stated function.

A means plus function claim is only infringed if:

- One, the function of the accused device is identical to the function disclosed in the claim element of the patent; and
- Two, the structure which performs that function in the accused device is the same or the equivalent of the structure described in the patent specifications.

The second of these two steps requires you to determine whether the accused device includes the same structure as described in the patent or its equivalent. You

may determine that a structure in the Ethicon device is equivalent if you determine that a person of ordinary skill in the art would consider the structure found in the accused device an insubstantial change from the structure disclosed in the patent specification.

This aspect did not concern, or determine, validity in this case. However, U.S. Surgical states that *Markman* requires the trial judge to perform the first portion of this instruction; that is, to determine the function and the structure or means that performs the function, and to give a detailed technical analysis for the infringement portion of the instruction; and that failure to do so fatally flawed the trial.

For example, U.S. Surgical requested instructions for the first element of claim 1 of the '057 patent, starting with the following proposed claim construction:

Clause i) of claim element 1b) reads "means for storing a plurality of surgical clips." This is a means-plus-function claim element. The stated function, as I interpret it, is to store a plurality of surgical clips.

We observe that this part of the proposed claim construction merely repeats the words of the claim. The requested instruction then told the jury what structure was described in the patent specification for performing this function:

The structure or means disclosed in the patent specification for performing this function is a clip track which holds an array of surgical clips and a spring to bias the clips toward the distal or far end of the instrument.

This information from the specification resolved no dispute, for there was none. Next, the requested instruction told the jury how to find infringement: the same instruction as in the general jury instruction that was actually given, quoted *supra*, but now drawn specifically to this claim element:

In order to find that this claim element of the '057 patent has been met, you must first find that defendants' accused devices perform the function of storing a plurality of clips. Then you must find that the defendants' accused devices have a clip track which holds an array of surgical clips and a spring to bias the clips toward the distal or far end of the instrument, or the equivalent structure, which performs this function.

This text, again, repeated the function in the same words as in the claim, and repeated the undisputed description in the specification. The requested instruction then stated that if the accused devices perform this function,

using the described means or an equivalent means, there is infringement. That is the same instruction as in the general instruction that was actually given, but made specific to this claim element. We doubt that *Markman* requires the trial judge to instruct as to an undisputed "claim construction" for every term, by simply parroting the words of the claim and then repeating the rule concerning infringement of means-plus-function claims. *Markman* explicitly recognized that the application of the claim to the accused device was for the jury. Indeed, Ethicon objected to this instruction as an improper attempt to direct the jury findings of infringement.

Similar instructions were proffered for the other claim elements. Another rejected instruction started with a similar repetition of the words of the claim as "interpreted" by the judge, and an undisputed restatement of what these words mean:

The final clause of claim element b) ii) calls for "clip closing means for sequentially closing said surgical clips." This is a means-plus-function claim element. The stated function of this particular means-plus-function claim element is "sequentially closing said surgical clips." I interpret this to mean the closing of surgical clips one at a time and one after the other.

In the infringement trial, the issue was not the definition of "sequentially," but the equivalency of the means that was described in the specification with the means that was used in the accused device, and issues concerning the clip advancing means. These aspects do not relate to obviousness, but to infringement. The additional text of this proposed instruction was objected to on its merits by Ethicon as an incorrect application of the law of 35 U.S.C. § 112(6). However, this aspect raised no disputed issues with respect to the determination of obviousness in view of the prior art. The dispute concerning the requested instructions related not to the prior art, but to the accused Ethicon devices.

Following is another claim element whose proffered "interpretation" was to repeat the words of the claim:

Claim element a) calls for a trocar having a cannula with valve means for sealing the cannula. The claim element "valve means for sealing said cannula" is a means-plus-function claim element. The stated function, as I interpret it, is to seal the cannula. There were infringement disputes concerning the valve means, and there was much debate at trial concerning the scope of this claim element as applied to Ethicon's devices. U.S. Surgical requested the instruction that the "valve means" includes and is infringed by all prior art valves and gaskets

and any other known structures for sealing the cannula.

The structure for performing this function includes all such structures contained in trocars known in the art at the time the '420 Patent Application was filed. Such trocars contain structures both to seal the cannula when no instrument is in the cannula, such as a flapper-type valve, and structures which form a seal between the instrument and the cannula when an instrument is inserted in the cannula, such as a gasket. The flapper valve may engage the gasket, as in the U.S. Surgical Surgipoint Trocar, or be separate from the gasket, as in reusable instruments that were known at the time the '420 Patent Application was filed. Therefore, if you find that the Ethicon Endopath Trocar is a trocar having the same or equivalent structure to the structures I have just described, then the accused devices satisfy claim element a) of Claim 1 of the '420 Patent.

We referred *supra* to this requested instruction, for it makes clear that validity of the U.S. Surgical patents was not grounded on asserted unobviousness of the valve means, and that a reasonable jury could have so found. The district court had left to the jury the issue of breadth of the valve means as it affected infringement, for Ethicon had vigorously objected to this instruction as prejudging the finding of infringement. In his post-trial opinion, the district judge expressed the view that the jury had accepted U.S. Surgical's construction of the valve means since it found infringement of the '420 patent claim. We do not reach the issue of infringement. However, whether the valve means was construed as broadly as U.S. Surgical requested, or quite narrowly as Ethicon had argued, the variety of valve structures shown in the prior art was in accordance with the jury's finding of obviousness in light of the prior art.

[2] The *Markman* decisions do not hold that the trial judge must repeat or restate every claim term in order to comply with the ruling that claim construction is for the court. Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy. Although claim construction may occasionally be necessary in obviousness determinations when the meaning or scope of technical terms and words of art is unclear and in dispute and requires resolution in order to determine obviousness, in this case none of these rejected instructions was di-

rected to, or has been shown reasonably to affect, the determination of obviousness.

Grounds for a new trial have not been shown. See *Santa Maria v. Metro-North Commuter R.R.*, 81 F.3d 265, 273 (2d Cir. 1996) ("A new trial must be granted if the court determines that the verdict is against the weight of the evidence, that the damages are excessive, or that, for other reasons, the trial was not fair to the party moving.") (quoting *Montgomery Ward & Co. v. Duncan*, 311 U.S. 243, 251 (1940)); *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 626, 225 USPQ 634, 643 (Fed. Cir. 1985) ("If prejudicial error occurred, or if the verdict is against the clear weight of the evidence, as an alternative to judgment n.o.v. a new trial may be granted, in the discretion of the trial judge.") (citing *Fairmont Glass Works v. Cub Fork Coal Co.*, 287 U.S. 474 (1933)).

We have not been shown prejudicial error in the jury instructions, or that the verdict of obviousness is against the clear weight of the evidence, or that substantial justice requires that the trial be voided.

#### The Dictionary

During its deliberations the jury requested a dictionary and, over the objections of both parties, was provided one by the court. U.S. Surgical states this is reversible error, while Ethicon states that any error was harmless.

U.S. Surgical proposes that the jury might have used the dictionary to look up definitions on which it had been instructed by the court or that had been explained by witnesses, such as "presumption" or "obviousness." The jury was instructed, as the parties agreed, to consider the ordinary meaning of the language used in the claims. U.S. Surgical does not mention any terms that were used outside of their ordinary meaning. The district court pointed out in its post-trial opinion that the instruction to consider the ordinary meaning, and the general assumption that definitions in a standard dictionary are common knowledge with which the jury is charged, support the provision of the dictionary.

[3] It is generally agreed that the provision of a dictionary to a jury, although not favored, is not grounds for a new trial. See *Wernsing v. General Motors Corp.*, 470 A.2d 802, 806 (Md. 1984) ("It appears to be the near universal consensus that a new trial is not awarded simply because a dictionary was before the jury.") (citing cases). U.S. Surgical offered no specifics as to words whose dictionary definitions may have adversely affected the verdict of obviousness.

ed to, or has been shown reasonably to, the determination of obviousness. Grounds for a new trial have not been shown. See *Santa Maria v. Metro-North Muter. R.R.*, 81 F.3d 265, 273 (2d Cir. 1994) ("A new trial must be granted if the evidence determines that the verdict is against the weight of the evidence, that the damages are excessive, or that, for other reasons, the verdict was not fair to the party moving.") (citing *Montgomery Ward & Co. v. Dunham*, 311 U.S. 243, 251 (1940)); *Shatter-Glass Corp. v. Libbey-Owens-Ford*, 758 F.2d 613, 626, 225 USPQ 634, 643 (2d Cir. 1985) ("If prejudicial error occurred, or if the verdict is against the clear weight of the evidence, as an alternative to a new trial may be granted, at the discretion of the trial judge.") (citing *Mont. Glass Works v. Cub Fork Coal*, 187 U.S. 474 (1933)).

**Dictionary.** During its deliberations the jury requested a dictionary and, over the objections of both sides, was provided one by the court. U.S. Surgical states this is reversible error, while Ethicon states that any error was harmless. U.S. Surgical proposes that the jury might have used the dictionary to look up definitions in which it had been instructed by the court or that had been explained by witnesses, such as "presumption" or "obviousness." The jury was instructed, as the parties agreed, to consider the ordinary meaning of the language used in the claims. U.S. Surgical does not mention any terms that were outside of their ordinary meaning. The district court pointed out in its post-trial decision that the instruction to consider the ordinary meaning, and the general assumption that definitions in a standard dictionary are common knowledge with which the jury is presumed to be familiar, support the provision of the dictionary. It is generally agreed that the provision of a dictionary to a jury, although not error, is not grounds for a new trial. See *Ing v. General Motors Corp.*, 470 F.2d 806 (Md. 1984) ("It appears to be a universal consensus that a new trial is warranted simply because a dictionary was offered the jury.") (citing cases). U.S. Surgical offered no specifics as to words or dictionary definitions that may have affected the verdict of obviousness.

Instead, U.S. Surgical seeks a presumption of prejudice and an automatic new trial.

Both sides cite *United States v. Weiss*, 752 F.2d 777 (2d Cir. 1985), as stating the controlling law in the Second Circuit, and each side argues that *Weiss* supports its position. In *Weiss* a criminal defendant was convicted of mail fraud, perjury, and RICO violations, and the jury obtained accounting books without the judge's knowledge or consent. Although the Second Circuit stated that "extra-record information that comes to the attention of a juror is presumptively prejudicial," 752 F.2d at 782-83, the court held that the trial judge's determination that the information had not prejudiced the defendant was not an abuse of discretion, and sustained the conviction.

U.S. Surgical argues that the practice of permitting the jury to have a dictionary would undermine the patentee's right to be its own lexicographer, and thus constitutes reversible error. However, U.S. Surgical does not direct us to any actual or reasonably possible prejudice, or any suggestion that the jury disregarded the court's instructions on the law of obviousness, or the plain meaning of the terms used in the claims and the prior art. Instead, U.S. Surgical argues that it was Ethicon's burden to establish that the jury did not misuse the dictionary, and that since that burden can not be met a new trial is required. However, the holding in *Weiss* was not for an automatic new trial. *Weiss* did not divest the trial judge of authority to decide whether the error, in that case viewed as juror misconduct, was in fact prejudicial. If the district court did not commit prejudicial error by providing the dictionary, a new trial on this ground is not warranted.

#### The Post-Trial Motions

Upon post-trial motions the district court, in a 34-page opinion, discussed validity and infringement. With respect to validity the court discussed the positions of the parties on the teachings of the prior art, the differences between the prior art and the patented inventions, and how the inventions, as a whole, would have been viewed by a person of ordinary skill in that art. The district court summarized the evidence that the prior art would have suggested the combination claimed in the '420 patent. The court referred to Ethicon's position that U.S. Surgical had adapted its own multiple clip applicator to endoscopic use, and the testimony that the only significant difference from the prior art multiple clip applicator was the elongation of the shaft and the seal, and that these were common to all endoscopic instruments.

The district court explained its conclusion that there was substantial evidence in support of the jury verdict of obviousness of the claims in suit. The court also explained its conclusion that the requirements of a new trial had not been met: that the verdict was not against the weight of evidence; that there was not a miscarriage of justice or prejudicial error during trial; or a seriously erroneous result.

#### The Motion Upon Remand

Following the remand from the Supreme Court to the Federal Circuit, U.S. Surgical moved this court to vacate the district court's judgment and order a new trial, on the ground that since the district court had not construed the claims as required by *Markman*, either before or after the jury rendered its verdicts, there is nothing for the Federal Circuit to review on appeal. U.S. Surgical states that it is entitled to a new trial of all issues of validity and infringement except for the verdicts in its favor (infringement of the '420 patent and that there was not inequitable conduct) for which Ethicon did not petition for *certiorari*.

Ethicon, opposing the motion, points out that the district court, in its opinion on the post-trial motions, discussed the claim construction that the jury necessarily adopted on the two aspects of claim scope that were in genuine dispute as applied to the Ethicon devices. Ethicon points out that the district court stated that it agreed with the jury's necessary constructions with respect to the valve means and the clip advancing means, and that the court explained its reasons for sustaining the verdicts based on those constructions. Ethicon points out that under *Markman* this court undertakes to perform any necessary claim construction *de novo*. Ethicon also points out that no disputed claim construction was material to the determination of obviousness.

[4] Concerning U.S. Surgical's proposed instructions on claim construction, as we have discussed, whatever their applicability to the issues of infringement, their omission did not prejudice the issue of obviousness. *Markman* did not hold that the trial judge must always parse the claims for the jury, whether or not there is an issue in material dispute as to the meaning or scope of the claims. Neither this court nor the Supreme Court held that the trial judge must conduct such a rote exercise, on pain of having to retry the case.

Ethicon had objected to the substance of U.S. Surgical's proposed instructions, as well as asserting that they were unnecessary. We need not resolve this issue, for U.S. Surgical

has not shown that there are unclear or ambiguous technical terms or words of art or related aspects of claim scope whose "construction" as requested by U.S. Surgical would negate the verdicts of obviousness. The jury was instructed, without objection, that the language of the claims was to have its plain meaning. There was no dispute as to the meaning of technical terms or words of art as used in either the prior art or the claims. The difference between the prior art and the claimed invention is a question of fact, *Graham*, 383 U.S. at 17, 148 USPQ at 467, and was not overruled by the Court's *Markman* decision.

U.S. Surgical argues that if the district court had construed the claims for the jury, the jury could not have reasonably accepted Ethicon's argument that U.S. Surgical had simply made known endoscopic adjustments in its prior art multiple clip applier. This went to the ultimate question of obviousness, which was decided by the jury upon finding and weighing and evaluating the factual evidence of the *Graham* factors. U.S. Surgical does not explain how any reasonable claim construction that it requested would have deprived the verdict of obviousness of its support. Further, *Markman* does not authorize the trial judge to remove from the jury the factual findings required by *Graham*.

On careful consideration of the substance of the instructions on claim construction that the district court declined to give, and the instructions on the issue of obviousness, all in light of the particular issues in this case concerning the prior art, the claimed invention, and the Court's discussion in *Markman*, we conclude that the omission of the requested instructions did not prejudice the determination of obviousness. The criteria for grant of a new trial have not been met. See *Santa Maria*, 81 F.3d at 273; *Shatterproof Glass*, 758 F.2d at 626, 225 USPQ at 643 (new trial appropriate when there was prejudicial error, or when verdict against weight of the evidence).

#### Conclusion

On review of the proceedings at trial, we conclude that there was substantial evidence from which a reasonable jury could have held that the claimed subject matter would have been obvious to a person of ordinary skill in this field at the time the invention was made. The judgment of invalidity is affirmed.

The case was vigorously litigated, with extensive testimony, physical exhibits, and argument. We have been directed to no unfairness or incompleteness or prejudice in the

jury instructions with respect to obviousness. A new trial was properly denied.

#### Costs

Costs to Ethicon.

**AFFIRMED; MOTION FOR  
NEW TRIAL DENIED.**

#### U.S. Court of Appeals Federal Circuit

Micro Chemical Inc. v. Great Plains  
Chemical Co.

Nos. 95-1504, -1514

Decided January 3, 1997

#### PATENTS

##### 1. Patentability/Validity — Anticipation — Prior sale — Degree of development (\$115.0707.05)

Federal district court erred in holding patent directed to method and apparatus for adding small amounts of ingredients to livestock or poultry feed invalid under on-sale bar of 35 USC 102 based on inventor's offer, before critical date, to sell weighing machine to feedlot manager, since at time of alleged offer, inventor had not reduced invention of patent to practice, had not substantially completed invention, and had not demonstrated high likelihood that invention would work for its intended purpose, and since inventor's "offer" therefore could not trigger on-sale bar.

##### 2. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (\$115.0903.03)

##### Patentability/Validity — Obviousness Combining references (\$115.0905)

Patent directed to method and apparatus for adding small amounts of ingredients to livestock or poultry feed would not have been obvious in view of prior art weighing machine and prior art volume machines in combination, since there is no evidence of motivation or suggestion to combine prior art machines, since motion of mixing elements in volume machine would have been expected to cause inaccurate weighing, and prior art therefore led away from idea of combining features of weighing and volume machines, and since inventor's extensive efforts to solve problem of isolating weighing system tend to show that one skilled in art would



Appendix 2:

*In re Young*, 927 F.2d 588, 18 U.S.P.Q.2d 1089 (Fed. Cir. 1991)

Applicant's claims for method of generating seismic pulse in water by use of at least three air guns disposed at critical distance from each other are obvious in view of prior patent which expressly teaches exact spacing set forth as limitation in each of applicant's claims, even though additional reference purporting to test different methods of pulse generation suggests avoidance of spacing taught in prior patent, since reference did not accurately test prior patent according to its teachings, particularly those regarding spacing, and therefore artisan of ordinary skill would have afforded reference little weight.

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of D. Raymond Young and John C. Wride (method and apparatus for generating an acoustic pulse in a body of water). From decision of Board of Patent Appeals and Interferences upholding final rejection of all claims, applicants' appeal. Affirmed.

Richard F. Phillips, Jr., Houston, Texas, for appellants.

Lee E. Barrett, associate solicitor (Fred E. McKelvey, solicitor, with him on brief), Arlington, Va., for appellee Patent and Trademark Office.

Before Newman, Lourie, and Rader, circuit judges.

Rader, J.

Raymond Young and his co-inventor John Wride (collectively Young) appeal from the October 31, 1989 and April 18, 1990 decisions of the Board of Patent Appeals and Interferences (Board). These decisions affirmed the final rejection of all claims in their application. The Board held Young's claimed invention obvious under 35 U.S.C. §103. This court affirms.

#### BACKGROUND

Young's application discloses a method and apparatus for generating an acoustic pulse in water. Acoustic pulse technology facilitates offshore seismic exploration. The acoustic pulse generates a large gas bubble in the ocean above geological formations on the ocean floor. The rapid expansion and collapse of the gas bubble create a shock wave in the water. The shock wave propagates through the water into the formations below the ocean bed. As the shock wave passes downward through these formations, each interface between adjoining earth strata reflects a portion of the shock wave. These reflections move upward through the ocean. Hydrophones at the ocean's surface can monitor these reflections. From these monitored reflections, geologists can generate a "seismic section" map which shows the configuration of strata in the ocean bed.

Today's most common sources of seismic shock waves are air guns. These air guns feature a chamber for storing and releasing on command highly compressed air. A high-pressure hose charges the gun with

compressed air for rapid firing during a seismic survey.

Acoustic pulse technology suffers from problems with bubble oscillation. Upon release of the compressed air, the bubble undergoes a rapid initial expansion and collapse. Several more expansions and collapses follow the initial collapse, but with diminishing amplitude. Each of these expansion-collapse events creates an additional shock wave. The geological strata reflect each of these additional shock waves. The multiple reflections, in turn, blur the resolution of the seismic section. Most blurring comes from the first oscillation after the initial bubble collapse.

Acoustic pulse technology uses a "primary-to-bubble ratio" to measure susceptibility to oscillation. This ratio compares the shock wave intensity of the initial expansion-collapse to the intensity of the first oscillation. A high ratio means the secondary shock waves are less likely to blur the seismic section.

Young tries to raise the primary-to-bubble ratio above prior art air gun sources by reducing the amplitude of the first oscillation. Young seeks this result by spacing at least three air guns in a characteristic array. The array separates the guns from each other by a critical distance. The distance,  $D$ , is at least 1.2 times greater than  $R$ , but less than or equal to twice  $R$ .  $R$  is the maximum radius of the initial air bubble from each gun.\* With this spacing, the bubbles from each gun intersect before any single bubble reaches its maximum radius. This intersection dampens the overall oscillation. Young's independent claims each include a spacing limitation within this range.

Independent claim 1 is illustrative:

A method of producing a seismic pulse in a body of water, including the steps of:

(a) disposing in the water a set of at least three air guns, each adapted to produce in the water a gas bubble having maximum radius substantially equal to the quantity  $R$ , where the guns are disposed at depths such that each produces, when fired, a bubble of maximum radius  $R$ , and the guns are disposed such that each gun is separated from each of the nearest guns thereto in the set by a critical distance,  $D$ , where  $D$  is substantially equal to  $\sqrt{2}R$ ; and

(b) firing the air guns substantially simultaneously to produce a seismic pulse in the water.

\* Mathematically,  $D$  is defined by  $1.2 R \leq D \leq 2.0 R$ .

pressed air for rapid firing during a seismic survey.

Acoustic pulse technology suffers from problems with bubble oscillation. Upon release of the compressed air, the bubble undergoes a rapid initial expansion and collapse. Several more expansions and collapses follow the initial collapse, but with diminishing amplitude. Each of these expansion-collapse events creates an additional shock wave. The geological strata reflect each of these additional shock waves. The multiple reflections, in turn, blur the resolution of the seismic section. Most blurring comes from the first oscillation after the initial bubble collapse.

Acoustic pulse technology uses a "primary-to-bubble ratio" to measure susceptibility to bubble oscillation. This ratio compares the shock intensity of the initial expansion-collapse to the intensity of the first oscillation. A high ratio means the secondary shock waves are less likely to blur the seismic section.

Young tries to raise the primary-to-bubble ratio above prior art air gun sources by increasing the amplitude of the first oscillation. Young seeks this result by spacing at least three air guns in a characteristic array. The array separates the guns from each other by a critical distance. The distance,  $D$ , is at least 1.2 times greater than  $R$ , but less than or equal to twice  $R$ .  $R$  is the maximum radius of the initial air bubble from each gun. With this spacing, the bubbles from adjacent guns do not intersect before any single bubble reaches its maximum radius. This intersection minimizes the overall oscillation. Young's independent claims each include a spacing limitation within this range.

Independent claim 1 is illustrative of a method of producing a seismic pulse in a body of water, including the steps of: (a) disposing in the water a set of at least three air guns, each adapted to produce in the water a gas bubble having a maximum radius substantially equal to a critical quantity  $R$ , where the guns are disposed at depths such that each produces, when fired, a bubble of maximum radius  $R$ ; (b) disposing the guns such that the guns are separated from each of the other guns thereto in the set by a critical distance,  $D$ , where  $D$  is substantially equal to  $R$ ; and (c) firing the air guns substantially simultaneously to produce a seismic pulse in the water.

Mathematically,  $D$  is defined by  $1.2 R \leq D$

Young's dependent claims define the number of the guns or their placement relative to each other or to the ocean surface.

The examiner rejected each of the claims as obvious under 35 U.S.C. §103 in light of five prior art references. The examiner relied primarily on U.S. Patent No. 2,619,186 to Carlisle (the "Carlisle patent" or "Carlisle") to reject Young's claims. Carlisle is the only reference cited by the examiner or Board which suggests the air gun spacing in Young's claims.

Young contested the Board's and the examiner's consideration of Carlisle. Young argued that Carlisle concerns reducing bubble oscillation for chemical explosives, not air guns. Young also argued that an article by Knudsen published six years after Carlisle in the journal *Geophysics* expressly discredits the teachings of Carlisle. W. Knudsen, *Elimination of Secondary Pressure Pulses in Offshore Exploration (A Model Study)*, 23 *Geophysics* No. 3 at 440 (July 1958) (Knudsen). Therefore, Young contended, a person of ordinary skill in the seismic exploration art would not have considered Carlisle when developing an improved seismic array.

The Board rejected Young's arguments. The Board held that the examiner appropriately applied Carlisle notwithstanding the teachings of Knudsen. On appeal, Young asserts as error only the propriety of applying Carlisle as a reference in light of Knudsen's allegedly contrary teachings.

## DISCUSSION

This court must decide whether the Board properly affirmed the examiner's rejection over Carlisle. Young has not challenged the other references cited in the examiner's rejection. Further, Young has not argued the merits of any particular claim apart from the others. Therefore, all claims stand or fall together with representative independent claim 1. See *In re Kaslow*, 707 F.2d 1366, 1376, 217 USPQ 1089, 1096 (Fed. Cir. 1983).

The Carlisle patent — "Seismic Exploration Method" — issued on November 25, 1952. Carlisle concerns minimizing bubble oscillation for chemical explosives used in marine seismic exploration. Carlisle controls bubble oscillation by spacing seismic sources to achieve a reduction of the secondary pressure pulse. Carlisle specifically teaches spacing the seismic sources close enough to allow the bubbles to intersect before reaching their maximum radius. Carlisle spaces the bubble centers closer than two maximum bubble radii, or less than "2.0 R" in Young's nota-

tion. Carlisle, col. 3, lines 57-60. Carlisle explains:

[T]he secondary energy normally available from these sources is dissipated by their mutual intersection and tends to eliminate the secondary seismic impulses created when the walls of the bubbles collapse.

*Id.* at lines 60-64. Thus, Carlisle expressly teaches the spacing limitation in each of Young's claims.

Notwithstanding Carlisle's teachings, Young argues that the Knudsen article discredits Carlisle. Knudsen describes a series of tests which evaluated four proposed techniques for suppressing bubble oscillation. Carlisle was one of the four. Knudsen's article opined that Carlisle yields no appreciable improvement in bubble oscillation suppression. The effective teaching of the Knudsen/Carlisle combination, Young argues, suggests avoidance of the spacing suggested in Carlisle. Therefore, Young would have this court conclude that his use of Carlisle's spacing would not have been obvious.

Young misunderstands the effect that Knudsen has on Carlisle. The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). Even if tending to discredit Carlisle, Knudsen cannot remove Carlisle from the prior art. Patents are part of the literature of the art and are relevant for all they contain. *In re Lemelson*, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968). For example, in *In re Etter*, 756 F.2d 852, 859, 225 USPQ 1, 6 (Fed. Cir.), cert. denied, 474 U.S. 828 (1985), a reference which disclosed obsolete technology remained in the prior art. This court considered the reference for what it disclosed in relation to the claimed invention.

[1] When prior art contains apparently conflicting references, the Board must weigh each reference for its power to suggest solutions to an artisan of ordinary skill. The Board must consider all disclosures of the prior art. *In re Lambert*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976), to the extent that the references are, as here, in analogous fields of endeavor and thus would have been considered by a person of ordinary skill in the field of the invention. The Board, in weighing the suggestive power of each reference, must consider the degree to which one reference might accurately discredit another.

[2] As prior art, the Board correctly weighed Carlisle to determine the patentability of Young's claims. Carlisle expressly teaches both the method and the advantages



of Young's claimed spacing. In fact, Carlisle expressly teaches the exact spacing set out as a limitation in Young's claims. Thus, the Board correctly attributed significant weight to Carlisle in its obviousness determination.

In determining what weight to accord to Carlisle as prior art, the Board also appropriately considered Knudsen's discrediting effect. The Board determined that Knudsen did not convincingly discredit Carlisle. Therefore, the Board appropriately concluded that Knudsen would not have led one skilled in the art to reject Carlisle.

Knudsen did not test Carlisle according to its teachings. For instance, Knudsen did not use an explosive charge in modeling Carlisle. Rather, Knudsen tried to simulate Carlisle with a capacitive electrical discharge in a barrel of oil.

Knudsen did not replicate Carlisle's teachings on spacing. Knudsen tried to model Carlisle by separating the seismic sources by one, two and three bubble radii. Knudsen at 42. At the maximum spacing of three bubble radii, the bubbles will not intersect at all. Carlisle specifically requires spacing to permit bubble intersection. Carlisle, col. 4, lines 47-52. At a spacing of one bubble radius, the two bubbles coalesced into one before the initial collapse. Knudsen at 45. If just one bubble is present, the bubble will oscillate as if no second seismic source was present. Carlisle specifically requires spacing to prevent the formation of one bubble. Carlisle, col. 4, lines 34-37. Finally, at the two bubble radii spacing in Knudsen, the bubbles will just barely intersect. Carlisle requires that the bubbles intersect before each bubble achieves its maximum radius. Carlisle, col. 3, lines 58-60. In sum, Knudsen did not duplicate or appropriately model Carlisle's spacing.

Knudsen's conclusion that Carlisle would "not be effective in eliminating the secondary pressure pulse" also directly contradicts data contained in Knudsen. The Knudsen data point for the two-radii horizontal bubble spacing, although not a completely accurate model of Carlisle, shows a 30% reduction of the secondary pressure pulse. Knudsen at 45, Table 4. This data point represents the only point where Knudsen approximates the spacing shown in Carlisle. At that point, Knudsen confirmed Carlisle's teachings.

The Board found that Knudsen "did not test the Carlisle technique under conditions which are directly comparable to the Carlisle disclosure." Weighing the discrepancies between the Knudsen model and Carlisle's teachings, as well as Knudsen's tendency to confirm Carlisle where the model approxi-

mated Carlisle, the Board concluded: "we do not agree that Knudsen discredits Carlisle."

Because Knudsen did not accurately test Carlisle, an artisan of ordinary skill would not have dismissed Carlisle in light of Knudsen as a whole. It is far more likely that the skilled artisan would have afforded little weight to Knudsen itself. The Board did not err in relying on Carlisle and discounting Knudsen.

### CONCLUSION

Knudsen is not so credible or persuasive of a contrary teaching that it would have deterred the skilled artisan from using the teachings of Carlisle. The examiner's use of Carlisle in his rejection of Young's claims is not clearly erroneous. The Board's decision affirming the examiner's rejection is therefore

**AFFIRMED.**

### Maine Supreme Judicial Court

Nobel v. Bangor Hydro-Electric Co.

No. Cum-90-271

Decided December 17, 1990

### COPYRIGHTS

#### 1. Elements of copyright — Federal pre-emption — Statutory pre-emption (§205.0803)

Plaintiff's claim for unjust enrichment and conversion under Maine law, arising from defendants' alleged unauthorized use of phrase "energy light," is pre-empted by Copyright Act, 17 USC 301(a), since unjust enrichment claim imposes liability by operation of state law, rather than by additional element of promise to pay, and thus gives right equivalent to rights under Copyright Act, and since conversion claim which does not allege any deprivation of tangible property is equivalent to unauthorized publication claim and is therefore pre-empted.

Appeal from the Maine Superior Court, Cumberland County, Alexander, J.

Action by Michael Nobel against Bangor Hydro-Electric Co., Maine Media Inc., and Brenda Garrand, for breach of contract, unjust enrichment, and conversion. From dismissal of all claims, plaintiff appeals. Vacated in part, affirmed in part, and remanded.

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